

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|---|--|---|
| Applicant's or agent's file reference WY 040184WO | FOR FURTHER ACTION <small>see Form PCT/ISA/220 as well as, where applicable, item 5 below.</small> | |
| International application No. PCT/IB2004/000439 | International filing date (day/month/year) 20/02/2004 | (Earliest) Priority Date (day/month/year) |
| Applicant NOKIA CORPORATION | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 7 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☒ Certain claims were found unsearchable (See Box II).

3. ☒ Unity of invention is lacking (see Box III).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 3

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☒ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB2004/000439

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04L25/03 H04L27/26 H04B3/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L H03H H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal, PAJ, WPI Data, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|---|
| X | IHALAINEN T; HIDALGO-STITZ T; RENFORS M: "On the Performance of Low-Complexity ASCET-Equalizer for a Complex Transmultiplexer in Wireless Mobile Channel" 7TH INTERNATIONAL OFDM WORKSHOP 2002, 11 September 2002 (2002-09-11), XP002299814 HAMBURG, GERMANY cited in the application the whole document | 1,2,5,6, 11-16, 19,20, 25-30, 33,34, 39-43 |
| A | ----- -/-- | 7,9,21, 23,35,37 |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

2 September 2005

Date of mailing of the international search report

09.09.2005

Name and mailing address of the ISA

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Baltersee, J

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB2004/000439

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|---|
| X | US 5 555 285 A (TAPIA JAVIER J ET AL) 10 September 1996 (1996-09-10) column 3, line 51 - line 61 column 14, line 9 - line 45 column 23, line 50 - column 27, line 29 | 1,2,5-7, 11-16, 19-21, 25-30, 33-35, 39-43 |
| A | ----- | 9,23,37 |
| X | US 2004/008618 A1 (HAYASHINO HIROSHI ET AL) 15 January 2004 (2004-01-15) paragraph [0006] paragraph [0021] - paragraph [0022] paragraph [0090] - paragraph [0096] paragraph [0108] - paragraph [0112] paragraph [0122] paragraph [0135] figure 1 | 1,5,15, 19,29, 33,43 |
| A | ----- | 7,9,12, 21,23, 26,35, 37,40 |
| X | US 2003/067997 A1 (KELLER MARK V ET AL) 10 April 2003 (2003-04-10) paragraphs [0001] - [0003] paragraph [0011] paragraph [0026] - paragraph [0032] | 1,8,10, 22,24, 36,38 |
| A | ----- NEZAMI M K ED - INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: "Techniques for acquiring and tracking MIL-STD 181B signals" MILITARY COMMUNICATIONS CONFERENCE. MILCOM 2002. PROCEEDINGS. ANAHEIM, CA, OCT. 7 - 10, 2002, IEEE MILITARY COMMUNICATIONS CONFERENCE, NEW YORK, NY : IEEE, US, vol. VOL. 1 OF 2, 7 October 2002 (2002-10-07), pages 224-231, XP010632104 ISBN: 0-7803-7625-0 page 225, right-hand column, Section "Preamble DFT-Based Acquisition" - page 226, left-hand column, two lines after equation (4) ----- -/-- | 5,7,9, 19,21, 23,33, 35,37 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2004/000439

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 3, 4, 17, 18, 31, 32
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☒ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 3, 4, 17, 18, 31, 32

According to claims 3, 17, 31 the number of frequency points is selected to correspond to the minimum number which can be expected to result in a sufficient channel estimation. In order to carry out the invention, the person skilled in the art thus would have to carry out a minimization problem according to a well-defined criterium in order to compute the minimum number of frequency points. The description, however does not disclose any details concerning such a minimization problem. The only information that is given in the description in addition to the definition of claims 3, 17, and 31 is that the minimization is carried out data block wise based on the determined frequency domain channel estimates. How this minimization is carried out based on the channel estimates is not disclosed, however. The disclosure therefore lacks the precise technical features which would render it apparent to the skilled person how to select the minimum number of frequency points. Consequently, claims 3, 17, and 31 do not comply with the requirements of Article 5 PCT.

The teaching of claims 4, 18, and 32 does not go beyond what is disclosed in the description in that they merely specify that the minimization is carried out data block wise based on the determined frequency domain channel estimates. Consequently, claims 4, 18, and 32 do not comply with the requirements of Article 5 PCT, either.

Since neither the description nor the Figures disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, they are considered so unclear that no meaningful search can be carried out with respect to claims 3, 4, 17, 18, 31, and 32 (Articles 5 and 17(2)(a)(ii) PCT).

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2, 5-7, 9, 11-16, 19-21, 23, 25-30, 33-35, 37, 39-43

Phase equalizer

2. claims: 8, 10, 22, 24, 36, 38

Amplitude equalizer

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB2004/000439

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|----|---------------------|----------------------------|---------------------|
| US 5555285 | A | 10-09-1996 | NONE | |
| ----- | | | | |
| US 2004008618 | A1 | 15-01-2004 | EP 0961448 A2 | 01-12-1999 |
| | | | JP 2000049747 A | 18-02-2000 |
| | | | US 6618352 B1 | 09-09-2003 |
| ----- | | | | |
| US 2003067997 | A1 | 10-04-2003 | NONE | |
| ----- | | | | |